The commonwealth or the accused may take such oral or written proof for or against the accused as it may deem it the best to present these facts.

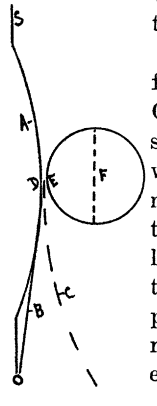
This act to be in full force and effect from and after its passage and approval as provided by law.

ARTHUR M. MILLER
UNIVERSITY OF KENTUCKY,
FEBRUARY 8, 1922

RELATIVITY AND STAR DIAMETERS

TO THE EDITOR OF SCIENCE: That Michelson's wonderful measurements on star diameters have a fundamental bearing on Einstein's theory and are capable of affording a more decisive proof of it than even the eclipse experiments does not seem to be yet appreciated. In my former note of March 25th, 1921, I expressed the hope that some one more competent than myself would discuss the subject; but nothing has so far appeared but a short note by Dr. Burns, and as he appears to be under some misconception of the theory, I will, with the Editor's permission, go into it a little more in detail.

Dr. Burns refers to an acceleration in the direction of propagation. But this field has nothing to do with the measurement of the diameter. What we do, virtually, is to divide the star disc F into halves by the diameter, shown as a dotted line, and take the centers of gravity of the two semi-circles as two sources. Obviously a considerable amount of the light will come from the edge, as at E, and all of it, except that coming from the diametric line, will be pulled sideways towards the diameter.



By Einstein's theory light from a source S to an observer O will be curved in the manner shown, since all world lines are warped in the neighborhood of matter. Dr. Burns's statement that there is no warping of the light from the star disc means that light originating from a prominence E on the star would not be warped, while light traveling past it, originating from an outside source S would; which necessitates an ether between F and O; which is contrary to the theory of relativity.

The really important point, which I had hoped to bring out in the discussion, is that a purely gravitational bending, shewn by the dotted line C, is not a mere warping, but a permanent change of path to a sort of hyperbola. If the light bending were a purely gravitational effect, all stars should shew measureable diameters, if above certain dimensions. But they do not appear to do so. As the only two alternatives seem to be gravitational bending or Einstein's theory, this seems to be a definite proof of the theory.

But we need a quantitative discussion, at, as I have said, the hands of men better qualified than myself. Mere guess work is not enough. It is true that the angular effect of the world line warping changes with distance, being twice the gravitational effect, but the amount of warping by the sun is approximately 1½ seconds, while the total angle subtended by Betelgeuse is only 1|30 of this, and Betelgeuse is somewhere around ten million times the size of the sun. A quantitative calculation is necessary, not only for Betelgeuse but also for those stars which shew no measurable disc, to explain the absence of a measurable gravitational bending, if Einstein's theory is not true.

REGINALD A. FESSENDEN

PRELIMINARY NOTE ON THE ETIOLOGY OF POTATO TIP-BURN

DURING the past two years investigations have been carried on at the Experiment Station of Pennsylvania State College to determine the etiology and specificity of the potato tip burn caused by the feeding of the potato leaf hopper, *Empoasca mali* Le B.

These experiments were in the form of a series of inoculations with aqueous and alcoholic extracts of *E. mali* Le B, and other potato feeding insects. The inoculated plants were exposed to sunlight of varied intensity by the use of glass and mesh cages to determine the role of sunlight in the development of the disease.

The results obtained from these experiments support the following conclusions:

1. Tip burn of the potato plant may be produced by the extract made from macerated nymph or adult, *E mali* Le B. and is transmissible by direct inoculation. This points to the existence of a "specific," either normal or extraneous, transmitted by the leaf hopper as the cause of the disease.

2. The active principle of this substance is most virulent in the nymphal stage of the leaf hopper.

3. This "specific" is present in diseased leaf tissue after infection by the leaf hopper and may be transmitted to healthy plants by reinoculation.

4. This substance is specific and the disease can not be simulated by inoculation with extracts from or by the feeding of insects other than *E. mali,* or by mechanical injury.

5. Sunlight is an important factor in the progress of the tip burn after its inception, but the absence of sunlight does not prevent the disease.

A more detailed account of the experiments supporting these conclusions will be published in the near future.

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SEPTEMBER 30, 1921

QUOTATIONS

ECONOMY IN PUBLICATION

THERE is no doubt that all our learned Societies are going through times of financial stress, owing to the war. Some of them are able to meet the difficulties by an increase of subscription, but others fear that this would diminish their membership, and thus compensate any estimated gain. Meanwhile, the increased cost of printing admits of no doubts at all, and Government help in mitigation is apparently not to be had—nor is it likely that private benefactions will come to the rescue. It seems eminently undesirable that scientific publication should be permanently diminished in amount, and minor economies in printing are apt to take up valuable time, which might be spent more profitably. We may hope that the cost of printing will not remain at the present high level, so that the future may bring less stress; but, meantime, we have to consider what is to be done *now.* With some hesitation I beg to put forward a suggestion for consideration in the special case of the Royal Astronomical Society, which is undoubtedly at the present moment in sore straits. The suggestion is that we should have an Economical Year as regards printing. For twelve months beginning either in January next (or, if that notice is too short, with the Annual Meeting in February next) let all the Fellows do their best to minimize the printing. There would be a vital difference between adopting this policy for one year and adopting it permanently, which, as already remarked, is strongly to be deprecated.

If the policy is publicly declared, the Society would probably find relief in many directions during the year; thus it could, without misunderstanding, discourage, or actually decline, papers which could be printed elsewhere, especially those coming from abroad. Usually these are more than welcome, but there would be no harm in asking our distinguished fellows and associates in other lands to publish elsewhere *for one year.* Of our own fellows many would welcome the opportunity to use one year rather for consolidating work already done than for pushing on new work. An exception should be made in the case of the younger astronomers, whose early fire should not be checked.

Again, I submit that, while the Annual Report of the Council is a document too valuable to lose permanently, there might be no serious disadvantage in cutting it down to very small proportions for one year—the thread could be readily picked up again in the following year. Here, again, some exceptions should obviously be made, especially the notices of Fellows deceased, a record which can not be intermitted. But observatory reports and most of the notes might be dropped.

The question arises how the meetings of the Society shall be adequately filled if the supply of papers is cut down? And this, of course, is a question which must be satisfactorily